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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/740,424	12/19/2000	Kiyotaka Tsukada	057329-0001	5114

20572 7590 05/23/2002

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EXAMINER

CHU, CHRIS C

ART UNIT	PAPER NUMBER
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2815

DATE MAILED: 05/23/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/740,424

Applicant(s)

TSUKADA ET AL.

Examiner

Chris C. Chu

Art Unit

2815

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 February 2002.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 - 9 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1 - 9 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 December 2000 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☒ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: |

DETAILED ACTION

Response to Amendment

1. Applicant's amendment filed on February 26, 2002 has been received and entered in the case.

Drawings

2. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the pair of side surfaces being concave surfaces must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

Art Unit: 2815

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1, 3, 4 and 7 are rejected under 35 U.S.C. 102(b) as being anticipated by Tsuji et al.

Regarding claim 1, Tsuji et al. discloses in Fig. 19A a printed circuit board comprising:

- an insulative substrate (51b);
- a conductor pattern (28A) formed on the substrate; and
- a protection film (51a) coating the substrate and the conductor pattern, wherein the conductor pattern (28A) includes a bottom surface contacting the substrate, a top surface opposite to the bottom surface, and a pair of side surfaces, each of the side surfaces having a lower side surface covered by the protection film and an upper side surface exposed from the protection film, wherein both the bottom surface and the top surface have widths, both the lower side surface covered by the protection film and the conductor pattern have heights, and wherein the width of the bottom surface is greater than the width of the top surface.

Regarding claim 3, Tsuji et al. discloses in Fig. 19A the pair of side surfaces being concave surfaces.

Regarding claim 4, Tsuji et al. discloses in Fig. 19A the height of the lower side surface covered by the protection film (51a) in the conductor pattern (28A) being 50% or greater and less than 100% of the height of the conductor pattern.

Regarding claim 7, Tsuji et al. shows in Fig. 22B the conductive pattern 28A-1 having an approximate dimension where the width of bottom surface is at least three times wider than the

Art Unit: 2815

top surface, and the height being about six times the width of the top surface. When applying this proportions to the claim formula the value is at least 0.1 but less than 2.5. It is noted that figures are not drawn to scale however, Fig. 22B does fairly suggest these proportions such that the claim range is suggested by Tsuji et al.

5. Claim 8 is rejected under 35 U.S.C. 102(b) as being anticipated by Miyazaki (Publication number: 01175729).

Regarding claim 8, Miyazaki discloses in Fig. 1 a method for fabricating a printed circuit board comprising the steps of:

- etching an insulative substrate (4) including a conductor to form a conductor pattern (6 and 3), wherein the conductor pattern is formed so that a width of a bottom surface contacting the substrate is greater than a width of a top surface, which is opposite the bottom surface;
- applying an insulative protection film (8) to the conductor pattern and the substrate; and
- removing part of the protection film (8) to expose an upper portion of the conductor pattern.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

Art Unit: 2815

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tsuji et al. in view of Dalal et al.

Tsuji et al. discloses the claimed invention except the conductor pattern having a trapezoidal cross-section that is perpendicular to the bottom surface of the conductor pattern. However, Dalal et al. discloses in Fig. 6 a conductor pattern (20) having a trapezoidal cross-section that is perpendicular to a bottom surface of the conductor pattern. Thus, it would have been obvious to one of ordinary skill in the art, at the time when the invention was made to modify Tsuji et al. by using the trapezoidal cross-section for the conductor pattern as taught by Dalal et al. The ordinary artisan would have been motivated to modify Tsuji et al. in the manner described above for at least the purpose of providing an easy joining between a conductor pattern and a solder ball.

8. Claims 5 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsuji et al. in view of Kimiya.

Regarding claim 5, Tsuji et al. discloses the claimed invention except the top surface and the upper side surfaces being coated by a plate. However, Kimiya discloses in Fig. 1(D) a top surface and an upper side surfaces being coated by a plate (44). Thus, it would have been obvious to one of ordinary skill in the art at the time when the invention was made to modify

Art Unit: 2815

Tsuji et al. by using the plate to coat the top surface and the upper side surfaces as taught by Kimiya. The ordinary artisan would have been motivated to modify Tsuji et al. in the manner described above for at least the purpose of increasing the bond strength between conductor patterns and external connectors.

Regarding claim 6, Tsuji et al. discloses in Fig. 19A a solder ball (46) contacting the conductor pattern (29) at the upper side surfaces.

9. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Miyazaki in view of Nakahara (Publication number: 03153049).

Miyazaki discloses in Fig. 1 a fabrication method further comprising the steps of: plating (9) the exposed upper portion of the conductor pattern.

Miyazaki does not disclose the step of joining a solder ball to the plated upper portion of the conductor pattern. However, Nakahara discloses in Fig. 3 a step of joining a solder ball (18) to a plated upper portion of a conductor pattern. Thus, it would have been obvious to one of ordinary skill in the art at the time when the invention was made to modify Miyazaki by using the step of joining a solder ball to the plated upper portion of the conductor pattern as taught by Nakahara. The ordinary artisan would have been motivated to modify Miyazaki in the manner described above for at least the purpose of increasing a bonding power of the bonding wire (read last line of CONSTITUTION).

Art Unit: 2815

Response to Arguments

10. Applicant's arguments with respect to claims 1 ~ 9 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

11. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chris C. Chu whose telephone number is (703) 305-6194. The examiner can normally be reached on M-F (10:30 - 7:00).

Application/Control Number: 09/740,424
Art Unit: 2815

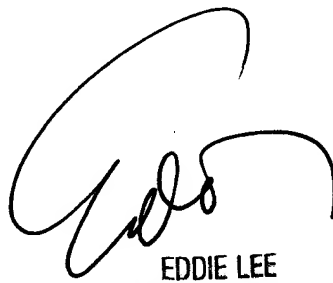
Page 8

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie C. Lee can be reached on (703) 308-1690. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7382 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Chris C. Chu
Examiner
Art Unit 2815

c.c.
May 20, 2002



EDDIE LEE
SUPERVISORY PATENT EXAMINER
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